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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/051,564 | 01/16/2002 | Yuv Raj Mehra | 205,325 | 9869 |

7590 04/04/2003
ABELMAN FRAYNE & SCHWAB
150 East 42nd Street
New York, NY 10017

EXAMINER

NORTON, NADINE GEORGIANNA

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

1764

DATE MAILED: 04/04/2003

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/051,564

Applicant(s)

MEHRA ET AL.

Examiner

Nadine Norton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☒ Claim(s) 25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

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DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed 1-17-03 in paper no.2 fails to comply with 37 CFR 1.98(a)(1), which requires a list of all patents, publications, or other information submitted for consideration by the Office. It has been placed in the application file, but the information referred to therein has not been considered.

Note: The references most likely listed in the information disclosure appear to be in the file. It appears as if the 1449 was either lost or inadvertently not included in applicants' submission. It is suggested that applicants attach a copy of the 1449 to the response to this office action.

Claim Objections

Claim 25 is objected to because of the following informalities: It appears as if "(j)" should be changed to "(j)". Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-9, 11-12, 14-24, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman (3,444,072) in view of Scott (5,414,168).

Applicants are claiming a hydroprocessing process involving cooling a separated effluent gas, contacting the cooled effluent gas with a lean liquid to absorb methane and higher hydrocarbons thereby producing a hydrogen rich gas stream, recovering the hydrogen rich gas stream from the adsorber, adding the hydrogen rich gas stream to the hydroprocessing reactor feed, and flashing the rich liquid stream in at least one flashing stage.

The reference of Lehman (3,444,072) discloses a hydroprocessing method in the form of hydrocracking. Suitable process conditions include a temperature of 700-900°F and a pressure in the range of 1500-3000 psig. See column 3, lines 52-56. Suitable feeds include a resid. See the figure, line (28). The process involves the addition of a hydrogen recycle and hydrogen makeup to a reactor. See the figure, lines (10) and (20).

Lehman (3,444,072) teaches the production of an effluent gas (e.g. vapor) stream (44). The vapor is cooled to ambient temperatures. See column 4, lines 25-28. Next, the cooled vapor is extracted in an absorber with a lean solvent to produce an overhead stream rich in hydrogen. See column 4, lines 40-50. Adsorber pressures are 0.2 to 0.75 of the system pressure. See column 5, lines 22-26. The reference further discloses that the hydrogen rich stream (50) is recycled. See column 4, lines 59-64. The rich oil (e.g. solvent) is flashed to produce a lean solvent for return to the absorber. See column 4, lines 59-64. The pressure of the first flash drum is 1250 psig and the pressure of the

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second flash drum is 20-60 psig. See column 4, lines 55-64. The vapor in the flash drum is a fuel gas. See column 4, lines 62-64.

The reference of Lehman (3,444,072) succeeds at disclosing a hydroprocessing process with process conditions overlapping those claimed by applicants. Lehman also succeeds at disclosing steps corresponding to applicants' cooling of an effluent gas, extraction with a lean solvent, recovery of hydrogen rich gas from an absorber, and flashing of a rich solvent to produce a lean solvent. In addition, the reference's disclosure of a fuel gas is considered to meet applicants' methane/heavy hydrocarbon gas limitation in claim 1 step e) because fuel gas contains methane and heavy hydrocarbons. The cooling of the gas effluent to "ambient" temperature is considered to encompass applicants' temperature limitations in claims 11-12. Also, the disclosure of hydrocracking is considered to meet applicants' hydrotreating limitation in claim 5 because hydrocracking is a type of hydrotreating. The configuration of the absorber appears to be counter-current. Also, the reference's make-up hydrogen is considered to meet applicants' purity requirements because the reference does not teach the presence of any other components in the make-up hydrogen.

Several differences are noted between the reference of Lehman (3,444,072) and applicants' claimed invention. Lehman (3,444,072) is silent about a C4-C5 hydrocarbon in the adsorption step. The separated hydrogen from Lehman's absorption step does not have a purity meeting applicants' 90-99% purity limitation. In addition, the reference is silent about the temperature of the lean solvent entering the adsorption zone as well as the chilling and compression of the lean solvent before it enters the adsorption zone.

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The reference of Scott (5,414,168) teaches that C4-C5 hydrocarbons are suitable for extracting hydrocarbon components from a gas to produce a hydrogen off gas. See column 8, lines 55-60.

Since the reference of Lehman (3,444,072) is silent about the specific hydrocarbon components contained in the lean extraction oil employed in the adsorption step, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lehman (3,444,072) by selecting an oil containing C4-C5 because the reference of Scott (5,414,168) illustrates that a C4-C5 hydrocarbon is suitable for the extraction of hydrocarbon components from a hydrocarbon containing gas. In addition, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a lean solvent that is compressed or chilled to any temperature that would accomplish the maximum adsorption of undesirable components from the desired hydrogen, including the specific temperatures/compression defined in applicants' dependent claims, because it is desirable to maximize conditions to achieve the separation of the purist hydrogen possible.

In addition, it would have been obvious to one of ordinary skill in the art at the time the invention was made desiring a more efficient hydroconversion process to adjust the adsorption step to obtain a higher purity hydrogen recycle because higher purity hydrogen (higher purity = higher partial pressure) desirably accomplishes a more efficient /less catalytically deactivated hydrocracking process.

Claim Rejections - 35 USC § 103

Claims 10 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman (3,444,072) in view of Scott (5,414,168) as applied to claims 1-9, 11-12, 14-24, and 26-28 above, and further in view of Gupta et al.(6,153,086).

A difference is noted between the modified teachings of Lehman (3,444,072) and applicants' claimed invention. The modified teachings are silent about additional amine absorption steps to remove hydrogen sulfide.

The reference of Gupta et al.(6,153,086) is cited to illustrate that amine (e.g. adsorption) is conventional for removing undesirable hydrogen sulfide from a gas. See column 4, lines 30-44.

It would have been obvious to one of ordinary skill in the art at the time the invention was made desiring the removal of the maximum amount of hydrogen sulfide from the hydrogen recycle to include an additional amine absorption step in the modified process of Lehman (3,444,072) because the reference of Gupta et al.(6,153,086) illustrates that amine adsorption is a known method for removing undesirable hydrogen sulfide from a hydrogen gas. Applicants' amine absorption steps do not distinguish over the modified process of Lehman (3,444,072) because such amine adsorption steps are known process steps with known effects.

Claim Rejections - 35 USC § 103

Claim 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman (3,444,072) in view of Scott (5,414,168) as applied to claims 1-9, 11-12, 14-24, and 26-28 above, and further in view of Mehra (5,687,584).

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A difference is noted between the modified teachings of Lehman (3,444,072) and applicants' claimed invention. The modified teachings are silent about the addition of ethylene glycol to the gaseous effluent gas prior to chilling and absorption.

The reference of Mehra (5,687,584) illustrates that it is known that ethylene glycol is effective for extracting undesirable water from a gas. See column 6, lines 29-35.

Since it is known that resids sometimes contain water as an impurity, it would have been obvious to one of ordinary skill in the art at the time the invention was made treating a gas effluent containing water to modify the Lehman (3,444,072) process to include an additional step wherein ethylene glycol is added to a gaseous effluent prior to chilling and absorption because the reference of Mehra (5,687,584) illustrates that the addition of ethylene glycol before chilling and adsorption is effective for the removal of undesirable water.

Prior Art of Record

The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The attached references are cited to illustrate the relative state of the art with respect to the purification and recycling of hydrogen in hydroprocessing processes.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nadine Norton whose telephone number is 703-305-2667. The examiner can normally be reached on Monday through Thursday from 8:30 am to 7:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9310 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0661.

N.N.

April 1, 2003

NADINE G. NORTON
PRIMARY EXAMINER

Nad Norton